Project Design Phase-I
Solution Architecture

Date	5-November 2023
Team ID	592358
Project Name	Walmart Store Sales Forecasting
Maximum Marks	4 Marks

Solution Architecture:

The Walmart Store Sales Forecasting solution architecture aims to address the specific business problem of accurately forecasting sales and understanding the impact of holidays on store sales. The architecture combines data processing, machine learning, web integration, and cloud deployment to create a robust and user-friendly system.
Key Components:

1. Data Ingestion and Preprocessing:
    - Data from 45 Walmart stores, including store information and monthly sales, is ingested and preprocessed. This involves data cleaning, normalization, and feature engineering to prepare it for modeling.
2. Machine Learning Models:
    - The solution utilizes three machine learning algorithms: ARIMA, Random Forest, and XGBoost to build predictive models. These models take into account historical sales data, store information, and holiday-related features to forecast sales accurately.
3. Holiday Impact Analysis:
    - An essential part of the solution is to evaluate the impact of holidays, including Christmas, Thanksgiving, Super Bowl, and Labor Day, on store sales. The weeks encompassing these holidays are assigned higher weights for evaluation to assess their influence accurately.
4. Flask Integration:
    - To make the solution user-friendly and accessible to Walmart staff, a Flask-based web interface is integrated. This allows users to input data, visualize sales forecasts, and access insights easily.
5. IBM Cloud Deployment:
    - The solution is deployed on IBM Cloud for scalability, reliability, and accessibility. IBM Cloud offers the infrastructure and services needed to host the system securely, making it available for all 45 Walmart stores.
6. Scalability and Flexibility:
    - The architecture is designed to scale as Walmart's operations grow. It can handle data from more stores and adapt to changes in the retail environment. Additional features and data sources can be incorporated to enhance forecasting accuracy.
7. Monitoring and Maintenance:
    - Ongoing monitoring and maintenance are crucial components of the architecture. Regular updates to the machine learning models and the Flask web interface ensure that the solution continues to provide accurate sales forecasts.
8. Security and Data Privacy:
    - Security measures are implemented to protect the integrity of data and ensure the privacy of sensitive information. Access controls and encryption mechanisms are in place to safeguard the system.

Overall, this solution architecture bridges the gap between Walmart's business problem of sales forecasting and the technology solutions needed to address it. It combines data analysis, machine learning, web integration, and cloud deployment to provide a comprehensive and effective tool for improving decision-making, optimizing inventory, and enhancing customer satisfaction within Walmart's retail operations.

Solution Architecture Diagram:

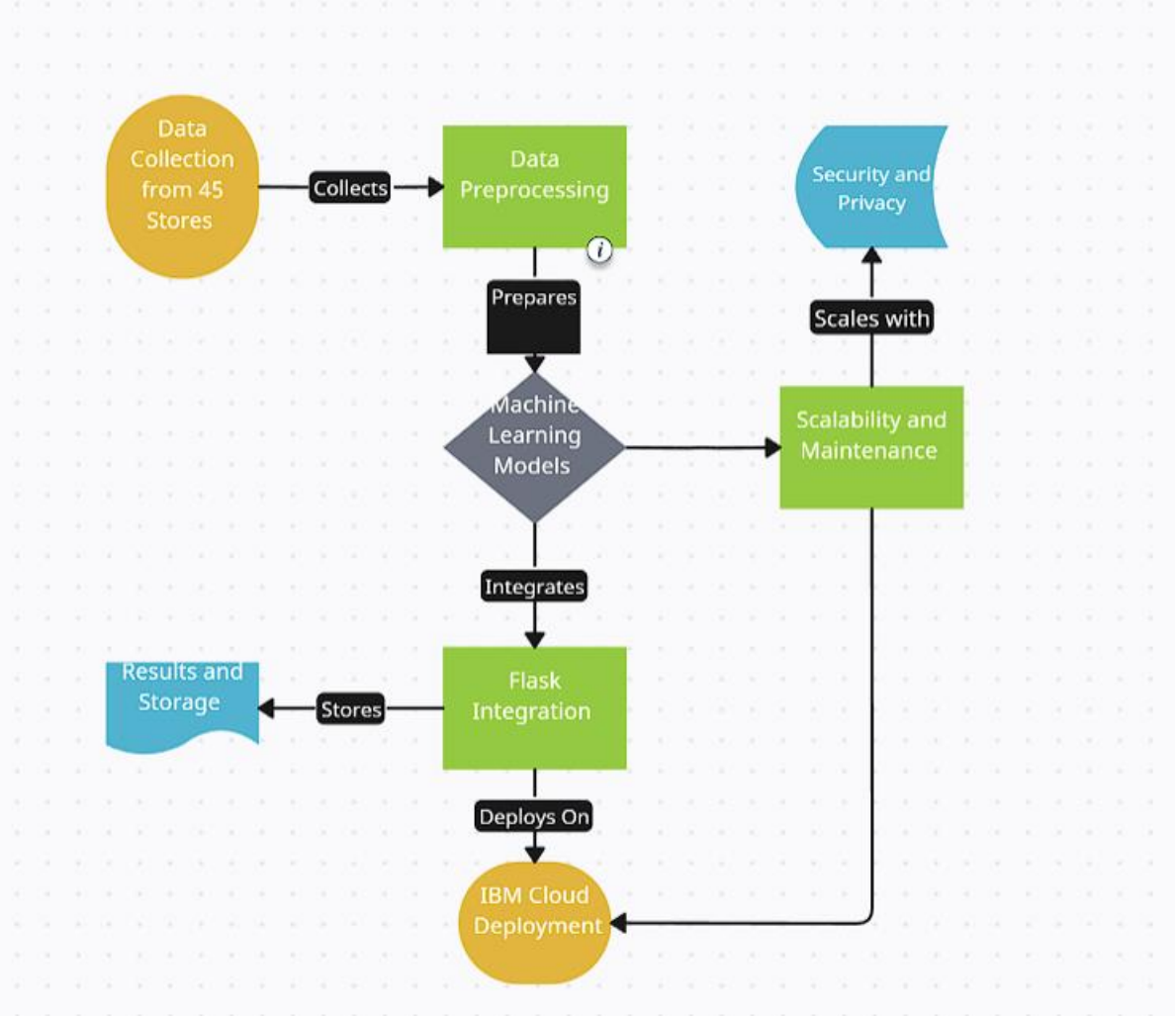

Figure 1: Architecture and data flow of the Walmart Sales Forecatsing